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United States Department of Agriculture
Agricultural Research Administration
Bureau of Entomology and Plant Quarantine

~~X~~ SOIL SAMPLER^{1/}

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Japanese beetle quarantine procedures provide for the shipment of plants grown in nursery sections treated under supervision with 25 pounds of DDT or 10 pounds of chlordane per acre and cultivated into the soil to a depth of 3 inches. Annual retreatment to maintain these concentrations is required. For this purpose the soils are sampled and the concentrations are determined by chemical analysis. The tool approved for use in taking the samples is described in this paper.

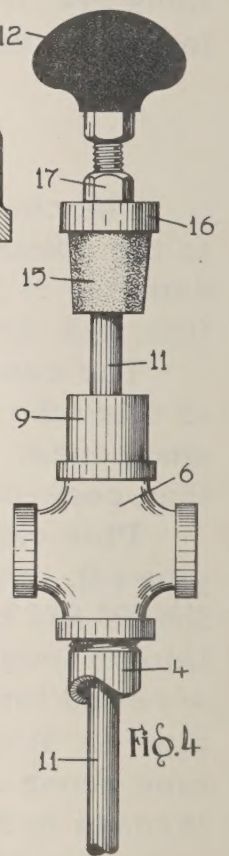
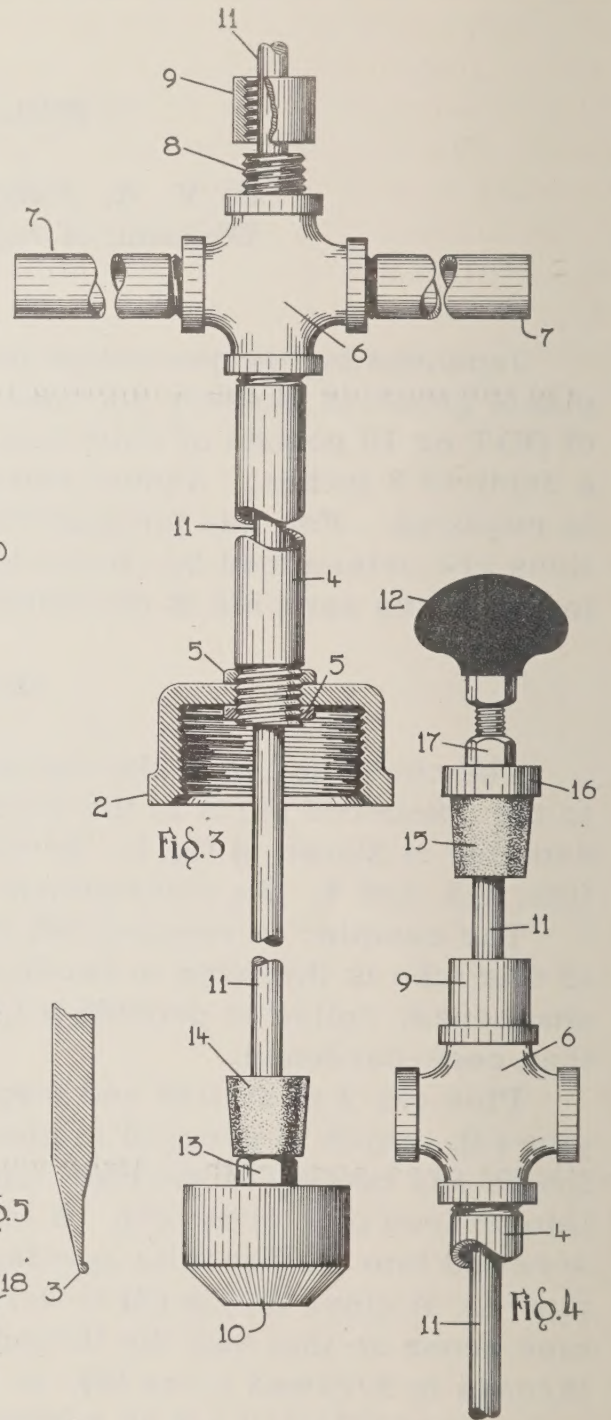
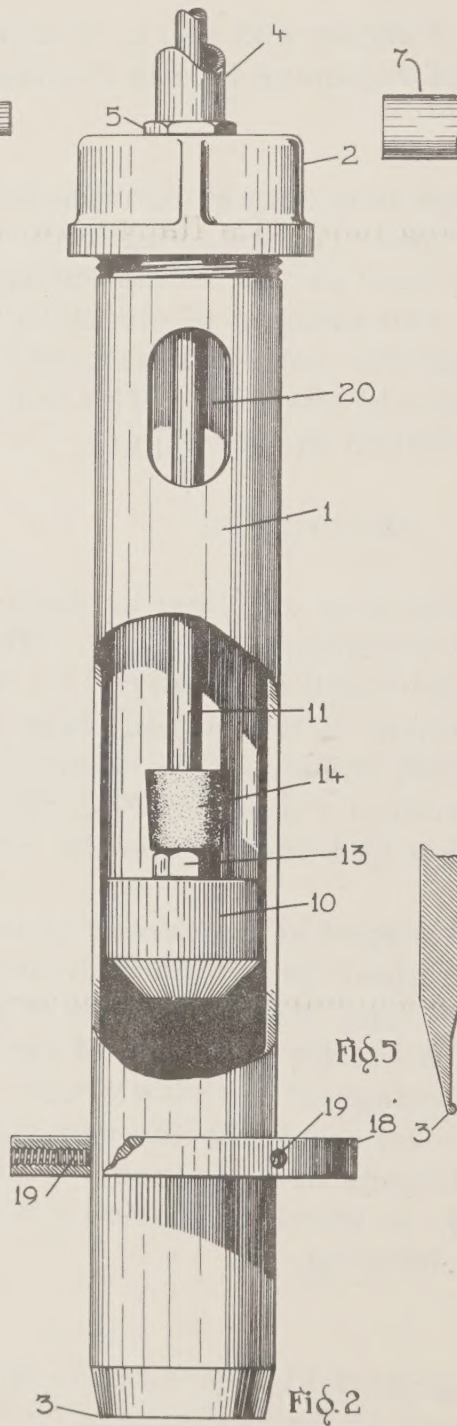
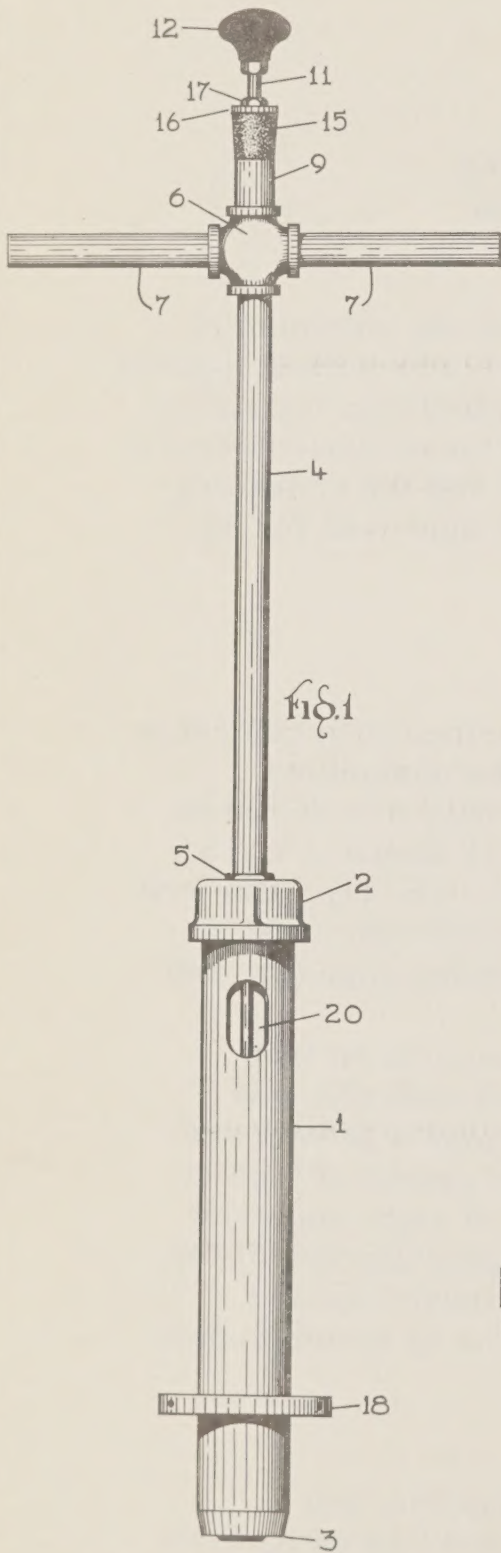
Description

The construction of the sampler can best be described with reference to the numbered parts in the accompanying plate. The assembled sampler is shown in fig. 1. Sections of it partly cut away are shown in figs. 2, 3, and 4. An enlargement of the cutting edge is shown in fig. 5.

The sampler is constructed about a steel sampling tube (1). One end of this tube is threaded to receive a pipe cap (2), and the other end is sharpened, rolled to provide a 1/64-inch lip on the cutting edge (3), and then case-hardened.

Pipe cap 2 is drilled and tapped at its center to receive an iron pipe (4), which is secured in place by two conduit lock nuts (5), one inside and outside of the pipe cap. The other end of pipe 4 is screwed into an iron pipe cross (6). A handle (7) made of two pieces of pipe is screwed into the opposite openings of the pipe cross at right angles to pipe 4. A close nipple (8) is screwed into the remaining opening of the pipe cross so that half the threads are exposed. To these exposed threads is screwed a cap (9), in which is drilled a hole to accommodate a steel rod (11) and act as a bearing.

^{1/} Adaption from an original design by Lon A. Hawkins and A. Gordon Galloway, formerly of the Division of Control Investigations.



A brass plug (10), machined to permit its free movement within the sampling tube (1), provides for the ejection of soil cores from the tube. The lower end of this plug is beveled at an angle of 45 degrees and the upper end is drilled and tapped at the center to receive rod 11. When screwed into place rod 11 is secured by a hex nut (13). A rubber stopper (14) with a hole through its center is slipped onto rod 11 to contact hex nut 13. The plug-and-rod assembly is inserted into the sampling-tube assembly so that the upper end of rod 11 protrudes beyond cap 9. Another rubber stopper (15) is slipped onto rod 11 to contact cap 9. A steel disk (16), drilled and tapped to accommodate the threads on rod 11, is screwed onto the rod to contact rubber stopper 15 and secured by a hex nut (17). A knob (12) is screwed onto the end of rod 11.

On the outside of the sampling tube (1) a flange (18) is secured by three equally spaced set screws (19). The hole through the center of the flange is slightly larger than the sampling tube to provide for easy movement. An opening (20) in the sampling tube near pipe cap 2 is provided to equalize the air pressure within the tube when plug 10 is raised and lowered. This opening also facilitates cleaning of the sampling tube.

Operation

When soil samples are to be taken, flange 18 is secured so that the distance between its lower face and cutting edge 3 is equal to the depth of the sample desired. Sampling tube 1 is forced into the ground by pressure applied to handle 7. As a consequence plug 10 is moved upward. As soon as flange 18 rests against, but not below, the surface of the ground, the sampler is withdrawn. The rolled lip on cutting edge 3 holds the soil core in the sampling tube. The soil is ejected by pressure applied through plug 10, rod 11, and knob 12.

This soil sampler provides a means for taking cores of known cross-sectional area and depth. After weighing, the weight/volume relationship of the core can be calculated, and chemical analyses can be reported in terms of pounds of insecticide per acre of specified depth.

In connection with the Japanese beetle quarantine a composite sample of 50 cores 2 inches in diameter and 3 inches in depth is taken from areas of not over 20,000 square feet. The composite is screened twice through a screen having 4 meshes per inch. The screened soil is weighed immediately to the nearest 1/4 pound and then spread in a shallow layer. About 25 small portions, sufficient to make a total of 1 quart, are taken at different places in this layer of soil and placed in a container that can be sealed. This subsample is made available for chemical analysis.

Material Needed

- 1 Piece of seamless steel tubing 2 inches inside diameter with 1/8-inch walls and 15 inches long, threaded at one end (1)
- 1 Galvanized pipe cap 2 inches in diameter (2)
- 1 Piece of galvanized pipe 1/2 inch in diameter and 15 inches long (4)
- 2 Pieces of galvanized pipe 1/2 inch in diameter, each 5 inches long and threaded at one end (7)
- 2 Conduit lock nuts, 1/2 inch (5)
- 1 Galvanized pipe cross, 1/2 inch (6)
- 1 Close nipple, 1/2 inch (8)
- 1 Galvanized cap 1/2 inch in diameter with 3/8-inch hole through center (9)
- 1 Brass plug 2 inches in length and diameter, with one beveled end (10)
- 1 Steel rod 3/8 inch in diameter and 36 inches long, threaded at both ends (11)
- 1 Knob, of the kind used on automobile gear-shift levers of the floor type (12)
- 2 Hex nuts, 3/8 inch (13 and 17)
- 2 No. 5 rubber stoppers (14 and 15)
- 1 Steel disk, 3/16 inch thick and 7/8 inch in diameter (16)
- 1 Flange, 1/2 by 4 1/4 inches (18)
- 3 Set screws, 1/4 by 1 inch (19)

